Articulated Football Goal Post

Related Application

This application claims the full benefit of my Provisional Application 60/449,480 filed February 21, 2003, titled "Hydraulically Actuated Football Goal Post," which is incorporated herein by reference in its entirety.

Field of the Invention

The invention relates to football goal posts, particularly to a goal post that can be adjusted in height and otherwise manipulated for improved safety and security, and readily placed in condition for use according to standard rules.

Background of the Invention

Rabid and out-of-control spectators and/or students at many football and other sporting events have frequently surged onto the field to destroy or topple the goal posts, presenting serious threats to human life, physical injuries, damage to and destruction of property, theft, and great expense in repairing and replacing the goal posts. Many presently existing goal posts are not easily removed or damaged, but some spectators have proven determined and innovative in carrying out their objective of destruction, sometimes bringing ropes, ladders and other equipment to aid in their endeavors.

A football goal is essentially a horizontal pipe or rod important only for extra points and field goals, not necessary for a touchdown. The horizontal rod or crosspiece must, by rule, be in a certain location and has flanking uprights so the officials can readily see whether a kick passes over it. But the support for the structure can be dangerous to the players as it normally is located near the action of the game.

There is a need for a goal and/or goal post that can safely manipulate the crosspiece to avoid damage by spectators and others, as well as to avoid injury to persons present when a mob is intent on damaging the goal. There is a need also for a goal that can be easily moved from the field for storage, as in the case of a multi-use stadium. And, there is a need for a goal structure that reduces the possibility of players colliding with it and sustaining injuries.

Summary of the Invention

My invention provides a cross member for a goal post which can be hydraulically elevated to a position well beyond the reach of most vandals and others intent on destruction. The goal can be readily lowered as well, permitting the easy installation and maintenance of television cameras and the like. Manipulation of the goal is accomplished from a remote control panel. The crossbar is supported preferably on a heavy steel upright that can optionally be placed farther back from the field than is commonly the case. The entire assembly can be removed from the field for storage.

The structure comprises a vertical column, a main boom, a nose boom, and a goal element including a crossbar and uprights on the ends of the crossbar. The structure is articulated at both ends of the main boom. During raising and lowering, the nose boom is caused to remain horizontal, so that the uprights on the ends of the crossbar remain vertical. The vertical column is bolted to a concrete base during use.

Brief Description of the Drawings

Figure 1a is a side elevational view and **Figure 1b** is a perspective view of my new goal post, in standard position ready for play

Figures 2a and **2b** show the goal in the elevated position.

Figures 3a and **3b** show the goal in the lowered position.

Figure 4 is a detailed view of the nose boom assembly.

Figure 5 details a hydraulic jack connection to the main boom.

Figure 6 is a schematic of the electrical and hydraulic systems.

Detailed Description of the Invention

Referring first to **Figures 1a** and **1b**, the vertical column **1** rests on base plate **2**, which is bolted to a concrete substructure not shown. Vertical column **1** may be fabricated from 4 pieces of 3/8" mild steel forming the main vertical box structure welded to the base plate **2**. Base plate **2** may have, for example, 8 ¾ inch holes designed for installation of bolts to provide a mechanical, removable connection between the vertical column **1** and the substructure, permitting complete removal of the apparatus from the field. Main boom **7** (sometimes called an arm herein), which may be made of a lighter metal such as aluminum, is connected to the vertical column **1** at pivot **9**. Nose boom **14** is connected to main boom **7** through a pivot **13**. Beneath nose boom **14** is upper control arm bracket **18**. Upper control arm bracket **18** is fixed to nose boom **14** and connected through pivot **12** to control arm **8**.

Control arm **8** is adjustable in length by a threaded insert **11**. Adjustment of the length of control arm **8** enables adjustment or correction of the vertical orientation of uprights **17** on the ends of crossbar **16**. Crossbar **16** is fixed to nose boom **14** through removable pin **15**, permitting disassembly of the crossbar from the rest of the structure. Control arm **8** is connected to the vertical column **1** at pivot **10**. Hydraulic jack **6** is pivoted and fixed to the vertical column **1** at lower mount **5**

and pivoted and fixed to main boom **7** at upper mount **19**. Vertical column **1** includes an access door **4** for the hydraulic pump, pump motor and other devices for operating the structure, which will be described in more detail with respect to **Figure 6**. Access door **4** has a lockable latch **3**.

Crossbar **16** may have nipples or vertical extensions, not shown, for insertion into uprights **17** so they may be easily attached or removed. The uprights **17** may be attached to crossbar **16** in any known acceptable manner. Both the crossbar **16** and uprights **17** may be made preferably of a light metal, but any substantially rigid material will suffice. Whether or not the uprights **17** are tubular, they may be adapted for insertion or attachment, at their upper ends, for wind direction indicators or other devices.

In **Figures 2a** and **2b**, the goal is in the elevated position. In this depiction of the invention, main boom **7** is at an angle about 60 degrees from the horizontal. A particular feature of the invention is that the nose boom **15** is maintained horizontal, so that uprights **17** are maintained in a vertical orientation. It will be observed that control arm **8** is maintained at a constant length and accordingly pivot **12** moves in a substantially circular arc as main boom **7** is elevated, while control arm **8 is** also held substantially parallel to main boom **7**, resulting in nose boom **14** being held substantially horizontal throughout the elevation of main boom **7** from its generally horizontal orientation of **Figures 1a** and **1b**. A major purpose of elevating the crossbar is to move it far out of the reach of a persons intent on damaging it. Accordingly, the apparatus should be capable of moving the crossbar to a height of at least fifteen feet; I prefer seventeen feet or more.

Referring now to **Figures 3a** and **3b**, the apparatus is seen to be in the lowered position, main boom **7** having been lowered from the horizontal about 30 degrees. It should be observed that the hydraulic jack **6** is approximately parallel to vertical column **1**, whereas it is angled slightly away from vertical column **1** in **Figures 1a** and **1b**. When the apparatus is in the elevated position as shown in **Figures 2a**

and **2b**, hydraulic jack **6** is still slightly angled from vertical column **1**, but not as much as when the apparatus is in the playing mode as in **Figures 1a** and **1b**. In **Figures 3a** and **3b**, the uprights remain vertical and nose boom **14** is horizontal, no adjustment being necessary in the length of control arm **8** because of the movement from fully elevated (as in **Figures 2a** and **2b**) to completely lowered, as in **Figures 3a** and **3b**.

In Figure **4**, the nose boom **14** and associated parts are shown in detail. Pin **15** can be removed to separate the crossbar **16** from nose boom **14**. Pivot **13**, connecting main boom **7** and nose boom **14**, together with pivot **12**, connecting upper control arm bracket **18** and control arm **8**, assures that nose boom **14** will be held substantially horizontal throughout the manipulation of the apparatus. If there is a slight deviation from the horizontal (which is readily detectable because the uprights **17** will not be vertical), an adjustment in the effective length of control arm **8** can be made by turning threaded insert **11** in one direction or the other. When the length of control arm **8** is coordinated with the effective length of main boom **7** (the distance between pivots **13** and **9**), it can automatically assure that the nose boom **14** will remain horizontal and the uprights **17** are vertical regardless of the angular position of the main boom **7**.

Since neither the elevated position nor the lowered position of the apparatus is normally used in the game, it may not be considered essential that the nose beam **7** remain strictly horizontal in those positions nor that the uprights extend exactly vertical; accordingly perhaps the only position for which some users may adjust threaded insert **11** will be the playing position shown in **Figures 1a** and **1b**. But because of the positioning and close relationship of main boom **7** and control arm **8**, an adjustment of the nose boom **14** to make it horizontal in the playing position will more or less automatically adjust the elevated and lowered positions also so that the nose boom **14** will be horizontal and the uprights **17** vertical.

The detail of **Figure 5** shows the articulation of main boom **7** in closeup fashion. Hydraulic jack **6** is connected at pivot **20** on upper mount **19**, which is fixed to the main boom **7**. Control arm **8** is situated on pivot **10** in vertical column **1**. Also on vertical column **1** is pivot **9** for the main boom **7**. The main boom **7** is elevated in this view, and accordingly if it were to be lowered to either the play or lowered position, hydraulic jack **6** would be retracted, pivoting on pivot **20**, causing the main boom **7** to be pivoted downwardly on pivot **9** and also causing control arm **8** to be pivoted on pivot **10**. The effective distances between pivots **9** and **10**, and **12** and **13**, are approximately equal, as are the effective distances between pivots **9** and **13** and pivots **12** and **10**. This double pivoting relationship thus forms an approximate parallelogram with the four pivots as corners, which assures that the nose beam remains horizontal throughout any manipulation of the main boom **7**.

The more or less diagrammatic **Figure 6** shows some power lines **40**, electrical control connections **41**, and hydraulic fluid lines **42**. Hydraulic jack **6** is extended or retracted according to the direction of flow of hydraulic fluid, which in turn is determined by a remotely located hydraulic controller **31**, normally operated by a human being. The reversible hydraulic pump **25**, its associated electric pump motor **26**, and the hydraulic fluid reservoir **27** are all located within the vertical column **1**, designated here as **24**, usually also together with a power junction box **30**, receiving AC power from an external source **32**, a battery backup **28**, and a relay switch **29** for switching from AC to DC in an emergency, i.e. if the external power source is cut or otherwise becomes unavailable. A check valve **21** may be used to guard against sudden interruption of power, or pressure loss. The controller **31** is able to command the pump. Wires connecting controller **31** to the electric motor **26** and three-way solenoid valve **23** should pass underground to the field operator's location remote from the goal. Design and construction of the concrete substructure mentioned in connection with **Figures 1a** and **1b** should provide a utility channel leading to the desired remote location for power source **32** and controller **31**. Ideally, the controller will have only three simple options –

play, elevated, and lowered. The operator normally needs only to choose one of the three options and the control system will operate the hydraulic jack **6** accordingly. The controller may use a wireless system to communicate with the pump motor and/or other devices within vertical column **1**.

Persons skilled in the art will recognize that any conventional hydraulic fluid may be used – that is, no special fluid is required, although of course it should have a low freezing point where freezing conditions may be expected. The system may be pneumatic – that is, the fluid may be air. As used herein, the terms "hydraulic" and "hydraulic fluid" means any fluid suitable for use in a positioning cylinder or other actuator such as hydraulic jack **6**. Alternatively, the motion of main boom **7** may be accomplished by mechanical means through gears or other leverage applied directly from an electric motor, such as an electric actuator. Any sutiable device for applying force to cause main boom **7** to pivot on pivot **20** may be satisfactory; such a device – that is, the means for moving the main boom and, sometimes separately, the nose boom, may be referred to herein broadly as an actuator.

It also may be observed that the nose boom is not essential if one is not concerned about the orientation of the uprights **17** as the apparatus is moved from the playing mode to the lowered or elevated mode. Also, it is not essential that the vertical column **1** be exactly vertical in orientation – it may "lean" either forward or backward, or may take the form of a pyramid or other support. My use of the term "vertical column" is intended to include any support that is capable of supporting the main boom **7** at a pivot **9**. For example, one might, for whatever reason, wish to support the pivot **9** on a structure having two legs and a horizontal member with a bracket for holding pivot **9**. Such a structure would be functionally and structurally equivalent to the vertical column illustrated herein and accordingly is intended to be included within the meaning of "vertical column." For my purposes, the pivot **9** will normally be at a height of about the

same height as a regulation crossbar, or somewhat lower as is evident in **Figure 1a;** this may be varied somewhat within the scope of my invention.

Figure 7 shows an alternate configuration in which the hydraulic jack **31** is on the side of vertical column **1** opposite that of **Figure 1a**, and pivot **38** on main boom **7** is leveraged somewhat differently from that of **Figure 1a**. Hydraulic jack **31** pivots on pivot **37** and pivot **38**; main boom **7** pivots on pivots **38** and **39**, which is located on vertical column **1**. In this illustration, it will be seen that there is no control arm **8**, but there is a second hydraulic jack **32** connecting nose boom **35** with main boom **7**. In the variation of **Figure 7**, if one desires to maintain nose boom **35** horizontal at all times, it is necessary to coordinate the action of hydraulic jack **32** with that of hydraulic jack **31**. If main boom **7** is elevated, hydraulic jack **32** will be retracted, and if main boom **7** is lowered, hydraulic jack **32** will be extended to assure that nose boom **35** remains horizontal. The controller in such a system will have somewhat more complexity than those of **Figures 1-5**, and a separate hydraulic line should be supplied to hydraulic jack **32**.

Therefore, it may be understood that my invention includes an articulating goal post for a football field comprising (a) a vertical column, (b) an arm pivoted thereon (c) a crosspiece near the end of the arm, and (d) upright members attached to the ends of the crosspiece. In another aspect, my invention includes a goal post comprising a vertical column having a base, a pivoted arm thereon, a crosspiece near the end of the pivoted arm, and two upright members, the upright members and the crosspiece defining a regulation kicking goal when the goal post is in a playing position, and means for moving the crosspiece and the upright members by the pivoted arm to an elevated position wherein the crosspiece is at least fifteen feet above the base. In yet another aspect, my invention is a football goal post comprising a crossbar, upright members on the ends of the crossbar, a nose boom rigidly connected to the crossbar, a main boom having a forward end and a rear end, the main boom being pivotally connected to the nose boom at the forward end, a vertical column including a pivot connecting the rear end of the

main boom to the vertical column, a hydraulic jack pivotally mounted on the vertical column and pivotally connected to the main boom, and a substantially rigid control arm pivotally connecting the nose boom and the vertical column. My invention may be otherwise varied within the scope of the following claims.

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